CLAIMS

What is claimed is:

1. An apparatus for optically measuring characteristics of a sample, said apparatus comprising:

a light source producing a light beam along an optical path;

a sample support for holding a sample within said optical path;

a reflective element within said optical path and downstream of said sample support;

means for positioning a sample held on said sample support, said reflective element, or both said sample held on said sample support and said reflective element within a collection range; and

a light detector in said optical path, wherein said light detector receives light reflected within said collection range.

2. The apparatus of Claim 1, wherein said means for positioning comprises:

at least one actuator coupled to at least one of said sample support and said reflective element, said at least one actuator moves at least one of said sample support said reflective element upstream and downstream in said optical path.

3. The apparatus of Claim 2, wherein said at least one actuator is a first actuator coupled to sample support, said first actuator moves said sample support upstream and downstream in said optical path; and

a second actuator coupled to said reflective element, said second actuator moves said sample support upstream and downstream in said optical path.

4. The apparatus of Claim 1, wherein said means for position comprises:

lens elements that focus said light beam;

an aperture stop in said optical path before said light detector, wherein at least one of said lens elements and said aperture stop are adjusted to alter said collection range to position a sample held on said sample support, said reflective element, or both said sample held on said sample support and said reflective element within said collection range.

5. The apparatus of Claim 4, wherein said lens elements comprise:

an objective lens within said optical path before said sample support;

a collection lens within said optical path after said aperture stop.

6. The apparatus of Claim 1, wherein said means for positioning configures said apparatus to operate in one of reflectance mode, transmittance mode, and mixed reflectance and transmittance mode.

7. The apparatus of Claim 1, wherein said optical path is at normal incidence to said sample held on said sample support.

8. The apparatus of Claim 1, wherein said optical path is at an oblique incidence to said sample on said sample support.

9. An apparatus for optically measuring characteristics of a sample, said apparatus being configurable to operate in one of reflectance mode, transmittance mode, and mixed reflectance and transmittance mode, said apparatus comprising:

a light source producing a light beam along an optical path;

a sample support for holding a sample within said optical path;

a reflective element within said optical path and downstream of said sample support;

at least one actuator coupled to at least one of said sample support and said reflective element, said at least one actuator moves at least one of said sample support said reflective element upstream and downstream in said optical path;

a light detector in said optical path, wherein said light detector receives light reflected within said collection range.

10. The apparatus of Claim 9, wherein said at least one actuator coupled to at least one of said sample support and said reflective element comprises:

a first actuator coupled to sample support, said first actuator moves said sample support upstream and downstream in said optical path; and

a second actuator coupled to said reflective element, said second actuator moves said reflective element upstream and downstream in said optical path.

11. An apparatus for optically measuring characteristics of a sample, said apparatus being configurable to operate in one of reflectance mode, transmittance mode, and mixed reflectance and transmittance mode, said apparatus comprising:

a light source producing a light beam along an optical path;

a sample support for holding a sample within said optical path;

a reflective element within said optical path and downstream of said sample support;

lens elements that focus said light beam;

a light detector in said optical path;

an aperture stop in said optical path before said light detector, wherein at least one of said lens elements and said aperture stop are adjusted to alter a collection range to position a sample held on said sample support, said reflective element, or both said sample held on said sample support and said reflective element within said collection range, said light detector detects light reflected within said collection range.

12. A method of measuring a characteristic of a sample, said method comprising:

producing a light beam to be incident on a sample;

reflecting a portion of said light beam off said sample to form a reflected light beam;

transmitting another portion of said light beam through said sample in a first general direction to form a transmitted light beam;

reflecting said transmitted light beam back toward said sample;

transmitting said transmitted light beam through said sample in a second general direction to form a second transmitted light beam, said second general direction being opposite said first general direction;

configuring a collection range, said collection range being a range within which light is reflected; and

detecting light reflected within said collection range.

13. The method of Claim 12, wherein configuring a collection range comprises:

moving said sample to a desired position in or out of said collection range.

14. The method of Claim 12, wherein configuring a collection range comprises:

moving a reflective element to a desired position in or out of said collection range, said reflective element being reflects said transmitted light beam back toward said sample.

15. The method of Claim 12, wherein configuring a collection range comprises:

adjusting at least one optical element to alter the focus of said light beam between said sample and a reflective element that reflects said transmitted light beam back toward said sample; and

adjusting at least one optical element to alter the focus of the light that is detected.

16. The method of Claim 12, wherein producing a light beam to be incident on a sample causes said light beam to be normally incident on said sample.

17. The method of Claim 12, wherein producing a light beam to be incident on a sample causes said light beam to be obliquely incident on said sample.

18. The method of Claim 12, wherein configuring said collection range causes at least one of said sample and a reflective element to be within said collection range, wherein said reflective element reflects said transmitted light beam back toward said sample.

19. The method of Claim 18, wherein configuring said collection range causes both said sample and said reflective element to be within said collection range.

20. The method of Claim 12, wherein said reflected light beam reflected from said sample is detected.

21. The method of Claim 12, wherein said second transmitted light beam is detected.

22. The method of Claim 12, wherein both said reflected light beam reflected from said sample and said second transmitted light beam are detected.